REMARKS

Applicants acknowledge the indication of the allowability of the subject matter of Claims 3, 4 and 6-10, as set forth in paragraph 6 of the Office Action. In particular, the latter claims would be allowable if rewritten in independent form. In addition, Applicants note that Claims 2 and 5 have been rejected only on formal grounds under 35 USC §112, second paragraph. For the reasons set forth hereinafter, Applicants respectfully submit that all of Claims 2-10 are allowable in their present dependent form.

Claims 2 and 5 have been rejected under 35 USC §112, second paragraph for failing to point out and distinctly claim the invention, based on a formal issue cited by the Examiner in paragraph 5 of the Office Action. In particular, it is questioned how the setpoint torque is established. In response to this ground of rejection, Applicants have amended paragraphs 2 and 5 to recite that a setpoint value is input to the electric drive motor. (This provision is supported by the specification at page 6, paragraph [0016], lines 7-8.) In this connection, it is noted that torque control techniques that utilize a motor torque setpoint determined by a control system are well known to those skilled in the art. Thus, the specification of the present application notes at page 7, paragraph [0017], lines 1-5 that the setpoint torque M_{setp} is monitored in order to react to instantaneous requests to the electric drive motor, made by components such as a cruise controller or an electric stabilization program (ESP). Accordingly, Applicants respectfully submit that Claims 2 and 5 are now clear and definite, and are allowable.

Claims 1 and 11 have been rejected under 35 USC §102(b) as anticipated by Sonntag et al (U.S. Patent No. 5,780,981), while Claim 1 has been rejected as anticipated by Adler et al (U.S. Patent No. 5,533,583). However, as set forth in greater detail hereinafter, Applicants respectfully submit that Claims 1 and 11 distinguish over both Sonntag et al and Adler et al.

The present invention is directed to a method for operating a load-dependent power generating system which supplies electrical energy to at least one electric drive motor in a vehicle. For this purpose, a processor unit 3 receives input information concerning actual motor speed of the electric motor 2, an input torque setpoint value and information concerning both the angular acceleration and position of the accelerator pedal, to project values for the rotational speed n_{pred} and setpoint torque M_{pred} of the electric motor 2. A set of characteristic curves stored in block 5 is then used to determine a performance setpoint value P for the electric drive motor 2, based on the predictive rotational speed n_{pred} and the predictive setpoint torque M_{pred}.

Thereafter, the performance setpoint value P (which is based on the predictive motor speed and torque setpoint values) is used to generate a predictive voltage U_{pred} of the power generating system, which is divided into the performance setpoint value P to generate a power setpoint current value I_{setp}. The latter is input to the power generating system 1.

The actual power I_{act} output by the power generator 1 is then compared to the power I_{mot} consumed by the motor, in order to generate a corrected torque request which is input to control the motor 2.

One advantage of the method according to the invention is that the evaluation of a demand for power is predicated not only on the position of the accelerator pedal but its movement as well. This permits a predictive calculation of the performance setpoint P, so that the time delay between the requested performance and the increase or decrease of the output from the power generating system can be minimized. That is, as a result of the earlier request of the predictively calculated future performance, the power generating system has more time in which to generate the drive current, and the electric motor can react more quickly.

It is apparent from the foregoing brief description that one aspect of the present invention resides on the use of predictively calculated parameters based on accelerator pedal movement in order to provide a power request to the power generating system before a torque request to the driver motor. These features of the invention are recited in the three paragraphs of the body of Claim 1. They are neither taught nor suggested by either of the Sonntag et al or Adler et al patents. The Sonntag et al patent, in particular, discloses a method for dynamically adjusting the power output of an electric driving unit of a vehicle in which electric energy is supplied by a fuel cell. For this purpose, the accelerator demand FP from an accelerator pedal 20 is used to calculate a desired current value I_{FP} which in turn is used to determine a desired compressor speed $n_{k\text{-}des}$.

As noted in the specification at Column 2, lines 44-46, the rotational speed n_k in turn determines the power P_{BZ} of the fuel cell 1. The actual volume of air flowing into the fuel cell V_{Lact} is processed in blocks 31-39 to generate a corrected accelerator demand value FP_{corr}, which is used alternatively with the input demand value FP to control the driving motor 18.

The Sonntag et al reference differs fundamentally from the invention as defined in Claim 1 in that there is no teaching or disclosure of either of the last two paragraphs of Claim 1. That is, Sonntag et al fails to disclose that accelerator pedal movement is used in addition to accelerator pedal position to calculate the performance setpoint value for the electric drive motor. In addition, it also fails to teach or suggest that the power request is made to the power generating system before a torque request is made to the drive motor. In this regard, the Office Action states at paragraph 2 (page 2) that the accelerator pedal movement in Sonntag et al is used to calculate the performance setpoint value. In support of this proposition, reference is made to Column 4, lines 14-20. However, a review of that portion of the disclosure indicates that it is directed simply to the calculation of a corrected accelerator pedal demand FP_{corr}, as noted previously. Nothing in this portion of the disclosure, or anywhere else in Sonntag et al suggests that the performance setpoint value for the electric drive motor is determined based on accelerator pedal movement in addition to accelerator pedal position. Indeed, Sonntag et al contains no discussion of the manner in which "accelerator demand FP" is determined from the accelerator pedal 20.

In support of the proposition that Sonntag et al discloses making a power request to the power generating system before a torque request to the motor drive, the Office Action refers to Column 3, lines 14-25. This portion of the specification, however, appears to be directed solely to the calculation of the corrected desire value FP_{corr} for the accelerator pedal demand, based on the measured air flow volume $V_{L\text{-}act}$. As noted in particular, at lines 21-25, the corrected desired value FP_{corr} is used alternatively with the actual input demand FP which is submitted to the driving unit 17. Insofar as Applicants have been able to determine, however, this portion of the specification makes no reference to the submission of a power request to the power generating system before a torque request to the drive motor. Accordingly, Applicants respectfully submit that Claim 1 as amended distinguishes over Sonntag et al.

Unlike Sonntag et al, on the other hand, the Adler et al patent does utilize signals which are indicative of not only the accelerator pedal position α, but also the accelerator pedal actuating speed $\dot{\alpha}$ and acceleration $\ddot{\alpha}$. (See, for example, Column 7, lines 15-21.) Aside from this similarity, however, the Adler et al reference differs from the present invention in important respects. In particular, the Adler et al patent fails to teach or suggest using the accelerator pedal position and movement values to generate a predictive setpoint value for the electric drive motor. Moreover, it also fails to teach or suggest making a power request to the power generating system before torque request to the drive motor.

In regard to the determination of a predictive performance setpoint value, the Office Action at paragraph 3 indicates that Adler et al discloses determining a performance setpoint value for the electric drive motor from an accelerator pedal position, referring to Column 7, lines 22-28. However, the so-called "kick down" signal referred to in this portion of the disclosure is generated solely in response to the presence of the accelerator in a fully depressed position. (See Column 8, lines 39-41.) Accordingly, the generation of the kick down signal is independent of either the speed or acceleration of the accelerator pedal. Moreover, nothing in this portion of the Adler et al patent, or elsewhere therein, teaches or suggests the use of accelerator pedal movement information to generate a predictive performance setpoint value for the electric drive motor.

Finally, paragraph 3 of the Office Action also indicates that Adler et al discloses making a power request to the power-generating system before a torque request to the drive motor, citing Column 8, lines 60-65. Applicants have been unable, however, to find any reference in this portion of the disclosure to a request to the power generating system, or to the proposition that such a request is made before a torque request is made to the drive motor. Rather, this portion of the specification indicates only that if the vehicle is already traveling at a maximum speed corresponding to the maximum output of the internal combustion engine, it is possible to achieve additional thrust by drawing energy from the energy storage unit 22 and supplying it to the electric motors. This paragraph contains no discussion of any role played by the power generating system itself, as opposed to the energy storage unit 22.

Accordingly, as can be seen from the above brief summary, while the Adler et al reference determines and utilizes accelerator pedal movement information for the purpose of controlling the operation of a hybrid electric drive vehicle, it does so in a manner which differs from that of the present invention. Applicants respectfully submit, therefore, that Claim 1 distinguishes over Adler et al for the reasons set forth above.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #225/50968).

Respectfully submitted,

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